

What is claimed is:

1. A local dry etching method for flattening semiconductor wafer by removing unevenness from the wafer surface using a nozzle for applying a flow of activated species gas to the surface and scanning the surface at a controlled relative speed, wherein a silicon oxide film formed on the surface is previously removed.
2. A local dry etching method according to claim 1, wherein said silicon oxide film is removed by a nozzle for applying a flow of activated species gas to the film and scanning the film at a controlled relative speed.
3. A local dry etching method according to claim 2, wherein the removal of said silicon oxide film and the removal of said unevenness are carried out with the same nozzle.
4. A local dry etching method according to claim 3, wherein the removal of said unevenness is carried out in the vacuum chamber right after the removal of said silicon oxide film in the same chamber while a vacuum is maintained.
5. A local dry etching method according to claim 4, wherein the removal of said silicon oxide film is carried out by scanning the nozzle at a constant speed.

6. A local dry etching method according to claim 5, wherein the removal of said silicon oxide film is carried out by making the etching profile of the activated species gas and the scan pitch wider than when said unevenness is removed.

7. A local dry etching method according to claim 6, wherein the width of said etching profile is adjusted by flow-in rate of activated species gas through said nozzle and flow-out rate of activated species gas through a duct surrounding said nozzle.

8. A local dry etching method according to claim 7, wherein said activated species gas includes fluorine radicals.

9. A local dry etching apparatus comprising:

- a vacuum chamber;
- a vacuum pump for pumping gas from said vacuum chamber;
- a stage, provided in said vacuum chamber, for mounting and fixing a semiconductor wafer;
- a plasma generator for generating activated species gas using discharge of fluorine compound gas;
- a nozzle for applying a flow of the activated gas generated by said plasma generator to the surface of the semiconductor wafer on said stage;

a duct which is connected to said vacuum pump and provided to surround said nozzle and through which the exhaust gas in the vacuum chamber passes;

an exhaust gas pumping rate control unit, provided between said vacuum pump and said vacuum chamber to control the etching profile of the activated species gas applied from said nozzle, for controlling the pumping rate of gas exhausted by the vacuum pump;

an X-Y drive unit which can move said nozzle in two directions along the surface of the semiconductor wafer on said stage relative to each other; and

a control unit for controlling said X-Y drive unit.